Criterion 6, Indicator 44: Direct and Indirect Employment in the Forest Sector and the Forest Sector Employment as a Proportion of Total Employment

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The purpose of this report is to provide information on the rationale and data provided on Indicator 44 for the U.S. *National Report on Sustainable Forests—2003*. Information on the rationale for the indicator and recommended data to be developed are taken from the report of the Technical Advisory Committee of the Montreal Process [1] and from reports of the U.S. Roundtable on Sustainable Forests Criteria and Indicators Technical Workshops. Data that have been developed are displayed and sources are provided. A summary of the data is contained in the *National Report on Sustainable Forests—2003*.[2]

A. Rationale for use of the indicator

1. Rationale from the Technical Advisory Committee (TAC)

The overall rationale provided for Indicators 44 (employment), 45 (wage and injury rates), and 46 (community viability and adaptability) is that forest-related jobs and community stability, or livelihood, are very important social values of forests.

Forest management is primarily a rural activity that often occurs in areas where there are few alternative economic development opportunities. In some cases, rural communities, by becoming

[1] See http://www.mpci.org/tac/mexico/tn1-6_e.html
[2] See http://www.fs.fed.us/research/sustain/

heavily reliant on the harvesting or processing of forest products, also become vulnerable to business cycles and structural changes in markets. Such communities may lack the capacity to adapt or respond to changes in external circumstances.

In other cases, the expansion of plantations, or the use of alternative forest products, can make a positive contribution to rural development. In some cases, the need of some parts of the forest sector to remain competitive in global markets has resulted in the adoption of new technologies that, while maintaining production levels, have reduced local levels of employment.

The needs of forest sector employees, residents of rural communities, subsistence users, and forest dwelling communities that rely heavily on the forest are important aspects of public decision making and policy.

There is also significant employment in urban areas in the processing of forest products, e.g., furniture making. Additional employment is associated with the recycling of wood products, park management, arboriculture, recreational enterprises, etc.

Rational for Indicator 44 (employment)—This indicator measures the contribution of the forest sector in providing employment, at national and regional levels.

Approaches to measurement—Consistent employment data are required. Data that may be useful for this indicator include the following:

- Total employment in all sectors
- Direct employment in the various forest sectors
- Indirect employment in appropriately identified downstream activities

The following may provide data for this indicator:

- Relevant information could be obtained from national institutions or agencies with responsibility for the collection of employment statistics.
- Direct employment figures may be available from forest industry associations.
- Indirect employment is usually estimated by a sampling procedure to develop multipliers that are applied to direct employment data.
- In some circumstances, direct employment figures may also need to be estimated.

2. Interpretation of the indicator as proposed by the TAC

Analysis of employment and census data from government and private sector sources over time may be useful in identifying trends. Employment trends interpreted in the context of community expectations, government policies, and industry developments in and close to the region are important. The forest sector includes not only the wood and non-wood forest products industries, but also forest research, management, protection, education, recreation, and tourism.

3. U.S. Clarification from the Roundtable Workshops

The indicator should be reworded as follows, “community economic dependence on the forest sector.”

Note: Indicator 46 had dimensions of economic dependence that are blended herein with employment, which constitutes a primary way of assessing economic dependence.

- The application of the indicator as a proportion of "total employment" may not be clear.
- Is it important to use this indicator at a regional scale, or should it be aggregated upwards to a national scale?
- Collection of data and analyses and reporting should be done at the lowest scale possible.
- There is a need to identify measures that report on forest sector contributions to other employment sectors. (e.g. How does the service industry benefit from the forest sector, and how does it link with a specific forest?)
- There is a need to define "indirect employment" in the forest sector as well and determine which SIC codes apply.
- The definition of "forest sector" needs to be broad and to incorporate the definition described below.

Three aspects of the indicator need clarification before specific variables can be identified:

1) What, specifically, is the definition of "forest sector? That is, which specific North American Industrial Classification System (NAICS) industries are included?
2) What is meant by "economic dependence?" (e.g., How can the degree to which a community is dependent on forests be measured)?
3) How is community to be defined?

Once the questions of which NAICS industries and what method for determining degree of forest dependence should be used are decided, employment (income) by industry will be the appropriate variable, using employment (or income) data as a proxy for economic activity.

If the indicator is to be reported at the national level, the question of aggregation is relevant. It is likely that the most appropriate way of expressing the indicator at the national level is "the number of communities with significant economic dependence on the forest sector," or some similar distribution function.

There remains the question of whether "indirect" employment should be included in the measurement of economic dependence. If so, a protocol for estimating "indirect" employment (e.g., by means of multiplier analysis) is needed.

B. Data provided to quantify the indicator

The TAC guidance requests data on employment in the forest sector that includes

1. wood and paper products industries,
2. non-wood forest products industries,
3. forest research,
4. management,
5. protection,
6. education, and
7. recreation and tourism.

There is also the request to provide information on direct employment and indirect employment associated with the forest sector.

The discussion from the Roundtable Workshop seems to imply this indicator should identify how dependent communities are on the forest sector for employment. That information is developed for Indicator 46 and not here.

To meet the intent of the indicator suggested by the TAC, the data we provide include information on direct employment and information on indirect employment.

1. Information on direct employment

Category 1. Wood and paper products industries

- Data on wood and paper products industries are provided by SIC code industry prior to 1997 and by NAICS code industry for 1997 and later years.
- Full-time and part-time employees for all domestic employment, for all manufacturing, and for SIC industries 24, 26, and the wood part of 25, for 1929–2000 (Table 44-1).
- Full-time and part-time employees for NAICS industries 113, 321, 322, and wood part of 337 by RPA region, 1997 (Table 44-2).
- Full-time and part-time employees per million acres of timberland for NAICS industries 113, 321, 332, and wood part of 337 by RPA region, 1997 (Table 44-3).

Category 2. Non-wood forest products industries

- Employment in Oregon and Washington for gathering floral and Christmas greens, for production of lumber and wood products, and for production of paper and allied products, selected years 1950–1994 (Table 44-4).
- Employment, number of establishments and payroll for trapping businesses: 1992-1999 (Table 45-5).
- Discussion on employment in non-wood forest products (Box 1).

Category 3. Forest sector research

- Research & development capacity by academic institutions, Forest Service research & development, and forest industry by criterion, 2001 (Table 44-6) (See report for Indicators 63–65, table 5).
- USDA Forest Service permanent employees by location, 1992 to 2001—employees at research stations (Table 44-7).

Category 4. Management

- Employees in state forestry agencies by RPA Region, 1996 (Table 44-8)
- USDA Forest Service permanent employees by location, 1992 to 2001—employees on National Forests, at Washington Office, and in Northern Area State and Private Forestry (Table 44-7).
- USDA Forest Service permanent and nonpermanent employees, 1975 to 2001 (Table 44-9).
- Employment related to Indian forestlands (Table 44-10).
- Permanent employees in the USDI Bureau of Land Management and USDI National Park Service (Table 44-10).

- Note: Employment in forest management in the form of forestry services and tract management is included in SIC 08, but data were not found to include here. After 1997, SIC code 08 industries were separated into various NAICS codes. For example, employment in tree nurseries is included in NAICS 113 industries in Table 44-2. Employment in forestry services (SIC 0851) is now recorded under NAICS code 1153.

Category 5. Protection

- Number of employees fighting forest wildfires during fire season, nationwide, in a typical year in recent years (Table 44-10).
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Category 6. Education

- Forestry related research employees in colleges and universities, the USDA Forest Service, and forest industry (full-time equivalents) (Table 44-10)

Category 7. Recreation and tourism

- Employment in 1999 for United States by region using estimated trips, spending per trip, and links between sectors (Table 44-11).
- Discussion of employment in recreation and tourism can be found in Box 2.

2. Information on indirect employment

Indirect employment arises from indirect effects and from induced effects of the expenditures of producers of goods and services.

- The indirect effect is the economic effect (supporting jobs) that occurs when a producer, in order to provide goods or services, purchases goods and services from another producer, who, in turn, also purchases goods and services.
- The induced effect is the economic effect (supporting jobs) that occurs through the payment of wages to employees of directly or indirectly affected industries. These wages are then used to purchase other goods and services that support jobs and these jobs are included in the induced effect.

Estimates of employment from indirect and induced effects are provided for wood and paper products industries (category 1) and for forest-based recreation and tourism (category 7). Employment from the indirect and induced effects is calculated by using dollars of industry output and multipliers (jobs per dollars of industry output). The multipliers are from the IMPLAN input–output model (Minnesota IMPLAN Group, Inc. 1997). Employment estimates from IMPLAN include full- and part-time jobs and jobs from self-employment.

See Table 44-12 for estimates of from IMPLAN of direct, indirect and induced employment associated with wood products, wood furniture, and paper industries and for forest recreation and tourism.

C. Interpretation of data relative to rationale from TAC

The data presented meet the intent of the TAC rationale to indicate amount and trend of direct employment in sectors associated with forestry, although data for some sectors are missing. For

example, we do not have data on contractors that do forest management work. The data do not indicate the degree to which localities are dependent on such employment as requested by the Roundtable clarification. Degree of dependence is discussed under Indicator 46.

The employment in wood products industries (about 1.4 million) has been increasing at about the same rate as employment in all manufacturing industries (about 9% of manufacturing), but more slowly than total U.S. employment. Employment per unit of timberland area in 1997 was highest in the North, followed by the South, which is about the same as the West, and then by the Rocky Mountain region.

Employment in producing non-timber forest products is judged to be in the tens of thousands, mostly in small enterprises. Because Indicator 30 suggests that production of non-timber forest products may be growing, it is likely that employment is growing as well.

Scientists engaged in forestry research numbered about 2,200 in 2001. If support staff are included, the total direct employment in forestry-related research may be 4,000 to 6,000.

Employment in forest management and protection is indicated in part by employment in State forestry agencies. In 1996, permanent employees numbered 12,405 and temporary or seasonal employees numbered 5,648. Highest total employment was in the South, followed by the North, Pacific Coast, and Rocky Mountains.

Employment in forest management, protection, and research is noted in part by employment in the USDA Forest Service. The number of permanent employees in 2001 (29,402) is a little less than the 1975 level (31,701), but was as high as 37,236 in 1980. The number of non-permanent employees has recently been about 11,000, but numbered more than 20,000 in the late 1970s (Table 44-9). The number of permanent employees declined about 20% from the early 1980s to 2001. Since 1991, there has been a 20% decline for the National Forest System, a 30% decline for Research, a small increase for the Northern Area of State and Private Forestry, a decrease in staff in the Washington office, and a large increase in Washington office staff in remote locations.

Nationwide, fire fighting and support jobs during fire season have recently been 12,000 to 15,000 for a typical year (Interagency Fire Center 2002)

D. Limitations of data

Employment in solidwood and paper industries—Employment in wood and paper products industries includes all employment in firms where wood and paper products are their primary products. Other products and services may be produced by these firms as well.

Employment in non-wood forest products industries—Employment information is not generally available. The level of employment can be inferred by the amount of production provided by analyses and summaries of USDI Bureau of Land Management permit data, industry surveys, USDA Forest Service Sales Tracking and Reporting System (STARS), Harmonized Tariff Code data, and other data sources and analysis at regional or local levels, but this

information relies heavily on local time-specific estimates and reports. Although for some industries, locations, and specific species these analyses may be comprehensive, the majority are incomplete and do not fully represent the range of products. Prominent data gaps include personal use and removals from private lands.

Employment in research and development—Data presented on employees in research and development do not include support staff, which may double to triple the number of employees directly employed by institutions conducting research.

Employment in recreation and tourism—See discussion in Box 2.

Estimates of indirect employment—Indirect employment estimates are limited by the quality of the direct measures (employment and total output of each industry) as well as by the estimates in the models of sectoral trade.

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Box 1. Discussion of employment in the non-wood forest products sectors

Businesses in the non-timber forest products (NTFP) industry are generally small, employing few people. There are exceptions, but most businesses are what are referred to as very small enterprises, employing less than ten people. Very small enterprises are relevant to informality for two important reasons. First, because of their low visibility, ease of displacement, and other small business/low capital investment characteristics, they provide the most appropriate setting for casual hiring, non-reported income, and other informal practices. The second point is that it is easier to operate a very small enterprise as a totally underground business. Fully informal small enterprises escape government record keeping. It is important to note that not all very small enterprises engage in informal practices (Alexander and others 2002).

Although employment data are not available for most segments of the NTFP industry, there is a considerable amount of seasonal employment in the wild edibles and the medicinal markets, and in other segments such as craft materials and transplants.

The floral and holiday greens markets are also significant throughout the United States. While data are difficult to obtain about the industry nationwide, surveys for the Pacific Northwest give an idea of the potential size and importance in other regions such as the North Central United States. Table 44-4 outlines available information on employment in Oregon and Washington in the floral and Christmas greens markets, and includes data from the lumber and paper industries for comparison. If the ratio of 5,800 floral and Christmas greens workers to 120,400 wood and paper products workers for Oregon and Washington in 1994 is indicative of the ratio of non-wood forest products workers to wood and paper workers in other regions, then the year 2000 level of wood and paper products workers of 1,505,000 (Table 44-1) could suggest that the number of non-wood forest products workers would be at least in the multiple tens of thousands nationwide.

Employment by businesses large enough to be recognized as hunting and trapping establishments was 2,375 in 1999 (Table 44-5).

Workers in the informal economy tend to have very specific characteristics that can be referred to as downgraded labor. Many receive fewer benefits or lower wages, or experience worse working conditions than they would in the formal economy. Many work in the informal economy because they must.

Box 2. Estimation of employment in the forest-based recreation and tourism sectors

Data are not separately collected on employment in the forest-based recreation and tourism sectors. Thus, estimates of employment were made by first estimating the expenditures on forest-based recreation and tourism, then converting this estimate to number of jobs, including both direct and indirect jobs. Indirect jobs include those from both the indirect effect and direct effect of expenditures. Expenditures were converted to number of jobs using employment multipliers from the IMPLAN input–output model (Minnesota IMPLAN Group 1997). The level of expenditure on forest-based recreation and tourism was estimated by first estimating expenditures on National Forest land (including forest, grass, and shrub-covered land), then expanding this estimate to all forest, grass, and shrub land for the United States. The level of National Forest expenditures was estimated by using (1) estimates of the number of recreation trips to National Forests by different categories of trips and (2) spending estimates for different categories of trips. Estimates of number of trips to National Forests were obtained from the *National Forest Visitor Use Monitoring National and Regional Project Results* (USDA Forest Service 2002).

The number of trips to National Forests was expanded to represent trips to all forest, grass, and shrub land by dividing by the percentage of all forest, grass, and shrub land owned by the National Forest system. Data on acres of National Forest land are from Vincent and others (2001); data on acres of total forest, grass, and shrub land are from the USDA Natural Resources Conservation Service (1997).

Expenditures per trip are from the National Visitor Use Monitoring (NVUM) spending profiles developed for trips to National Forest land (Stynes and White 2002). Expenditure data were excluded for trips over 30 days and for trips where National Forests were not the primary destination.

Estimates of forest-based recreation using the above procedure are shown in Tables 44-11 and 44-12.

There are several alternative methods to estimate the total number of recreation trips to forest land in the United States. The method described above estimated 640 million trips and is deemed the best method currently available. Other methods provided estimates ranging from 530 to 1.1 million trips. Alternative estimates were made using the Travel and Tourism Satellite Accounts (Kass and Okubo 2000) and the Travel Industry Association of America (1999), combined with results from a Pennsylvania Department of Natural Resources study (1999). Recreational activity data from the National Survey on Recreation and the Environment (NSRE) (see Indicator 37) counted 11 billion "activity days" for forest and open land types of activities. At this time, there are no methods to convert these activity days to number of trips, so it was not possible to use the NSRE data to estimate employment based on forest recreation.

Table 44-1. Full- and part-time employees for all domestic employment, all manufacturing, and SIC industries 24, 26, and wood part of 25, for 1929–2000 (thousands)

Year	All domestic employment	All manufacturing	Lumber and wood products - SIC 24	Paper and allied products - SIC 26	Total SIC 24 & 26	Wood furniture from part of SIC 25	Total SIC codes	Logging, wood, paper, & wood furniture industries as % of all manufacturing	Logging, wood, & paper industries as % of all domestic employment	Logging, wood, paper & wood furniture industries as % of all manufacturing	Logging, wood, paper & wood furniture industries as % of all domestic employment
1929	37,699	10,428	604	284	888			8.5%	2.4%		
1930	35,590	9,309	469	277	746			8.0%	2.1%		
1931	32,723	7,895	303	250	553			7.0%	1.7%		
1932	29,444	6,678	225	226	451			6.8%	1.5%		
1933	30,939	7,204	270	244	514			7.1%	1.7%		
1934	34,237	8,364	320	280	600			7.2%	1.8%		
1935	35,576	8,904	360	289	649			7.3%	1.8%		
1936	38,598	9,645	415	300	715			7.4%	1.9%		
1937	39,700	10,591	459	325	784			7.4%	2.0%		
1938	38,321	9,131	398	301	699			7.7%	1.8%		
1939	39,632	9,967	431	314	745			7.5%	1.9%		
1940	41,435	10,882	500	336	836			7.7%	2.0%		
1941	45,782	13,137	609	378	987			7.5%	2.2%		
1942	50,214	15,284	633	380	1013			6.6%	2.0%		
1943	56,016	17,402	585	393	978			5.6%	1.7%		
1944	57,276	17,050	559	390	949			5.6%	1.7%		
1945	55,614	15,186	524	394	918			6.0%	1.7%		
1946	49,690	14,493	578	449	1027			7.1%	2.1%		
1947	49,941	15,205	658	464	1122			7.4%	2.2%		
1948	51,325	15,521	862	470	1332			8.6%	2.6%		
1949	50,373	14,429	755	453	1208			8.4%	2.4%		
1950	52,428	15,241	824	485	1309			8.6%	2.5%		
1951	56,470	16,453	878	510	1388			8.4%	2.5%		
1952	57,770	16,752	821	504	1325			7.9%	2.3%		
1953	58,996	17,587	795	533	1328			7.6%	2.3%		
1954	57,514	16,395	730	534	1264			7.7%	2.2%		
1955	59,218	16,965	774	551	1325			7.8%	2.2%		
1956	60,987	17,327	769	570	1339			7.7%	2.2%		
1957	61,441	17,245	694	567	1261			7.3%	2.1%		
1958	59,967	15,919	655	558	1213			7.6%	2.0%		
1959	61,721	16,656	698	582	1280			7.7%	2.1%		
1960	62,823	16,779	676	592	1268			7.6%	2.0%		
1961	63,006	16,333	626	599	1225			7.5%	1.9%		
1962	64,664	16,901	635	615	1250			7.4%	1.9%		
1963	65,691	17,028	643	622	1265			7.4%	1.9%		
1964	67,338	17,330	669	625	1294			7.5%	1.9%		
1965	69,713	18,120	682	640	1322			7.3%	1.9%		
1966	73,531	19,319	693	667	1360			7.0%	1.8%		
1967	75,457	19,544	677	680	1357			6.9%	1.8%		

Table 44-1. Full- and part-time employees for all domestic employment, all manufacturing, and SIC industries 24, 26, and wood part of 25, for 1929–2000 (thousands)

Year	All domestic employment	All manufacturing	Lumber and wood products - SIC 24	Paper and allied products - SIC 26	Total SIC 24 & 26	Wood furniture from part of SIC 25	Total SIC codes	Logging, wood, paper, & wood furniture industries as % of all manufacturing	Logging, wood, & paper industries as % of all domestic employment	Logging, wood, paper & wood furniture industries as % of all manufacturing	Logging, wood, paper & wood furniture industries as % of all domestic employment
1968	77,618	19,898	695	691	1386			7.0%	1.8%		
1969	79,872	20,306	721	713	1434			7.1%	1.8%		
1970	79,770	19,442	706	702	1408			7.2%	1.8%		
1971	79,573	18,611	724	679	1403			7.5%	1.8%		
1972	81,604	19,080	743	684	1427	195	1622	7.5%	1.7%	8.5%	2.0%
1973	85,226	20,139	774	700	1474	198	1672	7.3%	1.7%	8.3%	2.0%
1974	86,594	20,121	733	701	1434	196	1630	7.1%	1.7%	8.1%	1.9%
1975	85,069	18,379	632	642	1274	172	1446	6.9%	1.5%	7.9%	1.7%
1976	87,427	19,082	693	673	1366	190	1556	7.2%	1.6%	8.2%	1.8%
1977	90,444	19,801	741	692	1433	195	1628	7.2%	1.6%	8.2%	1.8%
1978	94,813	20,667	777	700	1477	205	1682	7.1%	1.6%	8.1%	1.8%
1979	98,047	21,181	788	707	1495	201	1696	7.1%	1.5%	8.0%	1.7%
1980	98,403	20,432	710	691	1401	199	1600	6.9%	1.4%	7.8%	1.6%
1981	99,297	20,327	684	687	1371	196	1567	6.7%	1.4%	7.7%	1.6%
1982	97,826	18,943	610	664	1274	186	1460	6.7%	1.3%	7.7%	1.5%
1983	98,597	18,556	669	663	1332	185	1517	7.2%	1.4%	8.2%	1.5%
1984	103,192	19,509	721	681	1402	202	1604	7.2%	1.4%	8.2%	1.6%
1985	105,878	19,378	717	678	1395	200	1595	7.2%	1.3%	8.2%	1.5%
1986	107,802	19,064	725	675	1400	194	1594	7.3%	1.3%	8.4%	1.5%
1987	110,809	19,112	770	678	1448	214	1662	7.6%	1.3%	8.7%	1.5%
1988	113,971	19,475	791	687	1478	213	1691	7.6%	1.3%	8.7%	1.5%
1989	116,714	19,517	777	694	1471	210	1681	7.5%	1.3%	8.6%	1.4%
1990	118,209	19,206	755	697	1452	202	1654	7.6%	1.2%	8.6%	1.4%
1991	116,707	18,535	698	688	1386	183	1569	7.5%	1.2%	8.5%	1.3%
1992	117,198	18,179	702	689	1391	188	1579	7.7%	1.2%	8.7%	1.3%
1993	119,265	18,175	732	692	1424	187	1611	7.8%	1.2%	8.9%	1.4%
1994	122,235	18,425	776	693	1469	193	1662	8.0%	1.2%	9.0%	1.4%
1995	125,158	18,594	790	693	1483	197	1680	8.0%	1.2%	9.0%	1.3%
1996	127,494	18,579	801	683	1484	196	1680	8.0%	1.2%	9.0%	1.3%
1997	130,640	18,772	821	686	1507			8.0%	1.2%		
1998	133,968	18,923	840	679	1519			8.0%	1.1%		
1999	136,872	18,669	857	669	1526			8.2%	1.1%		
2000	139,861	18,571	849	656	1505			8.1%	1.1%		

Sources: SIC 24, 26 (USDC BEA 2002a,b,c); SIC 25, 1977–1992 (USDC BOC 1995a,b); SIC 25, 1993–1996 (USDC BOC 1998);
Note: Definitions of SIC groups changed somewhat in 1987. Thus, data before 1987 are not strictly comparable with data for 1987 and after.
Codes used under SIC 25 are 2511, 2517, 2521, and 2541.

Table 44–2. Full- and part-time employees for NAICS industries 113, 321, 322, and wood part of 337 by RPA region, 1997 (number of employees)

Industry/ NAICS code	North	South	Rocky Mountains	Pacific Coast	Employment not disclosed by State	Total
Logging/113	3,108	6,647	898	2,684	69,866	83,203
Wood products/321	195,174	237,153	40,259	99,220	1,810	573,616
Paper products/322	301,437	179,314	15,351	57,228	22,805	576,135
Wood furniture/ parts of 337	53,452	84,628	7,774	23,329	13,276	182,459
Total	553,171	507,742	64,282	182,461	107,757	1,415,413

Note: Codes used under NAICS 337 are 33711, 337122, 337211, and 337212.
Source: USDC (1999).

Table 44-3. Full- and part-time employees per million acres of timberland for NAICS industries 113, 321, 322, and wood part of 337 by RPA region, 1997 (employees per million acres)

Industry/ NAICS code	North	South	Rocky Mountains	Pacific Coast	Employment not disclosed by State	Average
Logging/ 113	19	33	13	37	139	165
Wood products/ 321	1,224	1,180	567	1,374	4	1,139
Paper products/ 322	1,891	892	216	793	45	1,144
Wood furniture/parts of 337	335	421	109	323	26	362
Average	3,470	2,526	905	2,527	214	2,811

Note: Codes used under NAICS 337 are 33711, 337122, 337211, and 337212.
Sources: USDC (1999); Timberland area, Smith et al. (2001).

Table 44-4. Full- and part-time employment in Oregon and Washington for gathering flora and Christmas greens and for production of lumber and wood products and paper and allied products, selected years 1950–1994 (from Alexander and others 2002)

Year	Lumber and wood products	Paper and allied products	Floral and Christmas greens
1950	Not calculated	Not calculated	2,000[a]
1953	134,400[b]	2,100	Not available
1989	109,300[c]	26,500	10,300[d]
1990	103,600[e]	27,200	N/A
1994	91,100	26,300	5800[f]

[a] Heckman 1951.
[b] USDA FS 1982.
[c] USDA FS 1990.
[d] Schlosser and others 1991.
[e] Warren 1996.
[f] Estimated from Blatner and Schlosser (1997); includes Washington, Oregon, Idaho, and Montana.

Table 44–5. Number of hunting and trapping establishments, payroll, and total number of full- and part-time employees for selected years

Year	Number of establishments	Payroll (million current dollars)	Number of employees
1992	179		
1997	295	48.9	1,886
1998	345	58.6	2,107
1999	360	68.9	2,375

Source: USDC BOC 2002.
Note: 1992–1997 data are for SIC 0971; 1998–1999 data are for NAICS 1142.

Table 44-6. Research & development capacity at academic institutions, USDA Forest Service research & development, and forest industry by criterion, 2001 (full-time equivalent staff)

	Academic institutions	Forest Service	Forest industry	Total
Criteria 1 Biological Diversity	318	122	10	450
Criteria 2 Productive Capacity	221	161	75	299
Criteria 3 Ecosystem Health	128	166	5	300
Criteria 4 Soil & Water	186	92	22	122
Criteria 5 Carbon Cycles	77	43	3	393
Criteria 6 Socio-Economics	293	90	10	166
Criteria 7 Institutional Framework	138	27	---	165
Total	1,361	701	124	2,186

Source: Draft report, A review of capacity to conduct and apply research and development aimed at improving forest management and delivery of forest goods and services, 7 March 2002, for Criteria 7, Indicators 63–65.

Table 44–7. USDA Forest Service permanent employees by location, 1992–2001

Year	National Forests	Research stations	Northern Area of State & Private Forestry	Washington Office	Washington Office detached	Washington Office total	Total
1991	30,632	2,469	138	845	310	1,155	34,394
1992	31,065	2,628	158	899	335	1,234	35,085
1993	30,180	2,622	155	896	337	1,233	34,190
1994	27,240	2,393	153	835	400	1,235	31,021
1995	25,740	2,304	152	753	1,825	2,578	30,774
1996	25,531	2,100	149	683	1,863	2,546	30,326
1997	24,847	2,039	146	651	1,875	2,526	29,558
1998	23,555	2,040	145	665	1,940	2,605	28,345
1999	23,247	2,051	153	694	1,972	2,666	28,117
2000	24,605	1,708	152			2,834	29,299
2001	24,605	1,708	152			2,937	29,402

Source: 1991–1999, USDA FS HR (2002a); 2000–2001, USDA FS HR (2002b).
Number of employees shown for Oct. 1 or near Oct. 1 each year.

Table 44–8. Employees in State forestry agencies by RPA Region, 1996

Employee status	North	South	Rocky Mountains	Pacific Coast	Total
Permanent	3,399.0	6,064.5	924.7	2,017.0	12,405.2
Temporary or seasonal	1,934.0	1,508.0	492.0	1,714.0	5,648.0

Source: National Association of State Foresters 2002.

Table 44-9. USDA Forest Service permanent and non-permanent employees, 1975–2001

Year	Permanent	Non-permanent
1975	31,701	18,076
1976	—	—
1977	33,719	20,480
1978	—	—
1979	34,690	25,450
1980	37,236	14,594
1981	36,869	19,053
1982	37,174	15,624
1983	36,077	14,899
1984	33,995	15,225
1985	32,924	14,014
1986	30,436	14,121
1987	30,301	15,785
1988	30,899	14,519
1989	32,924	14,524
1990	33,781	13,011
1991	34,861	13,821
1992	35,425	15,151
1993	34,588	15,363
1994	30,978	14,592
1995	30,676	13,009
1996	30,347	11,075
1997	29,558	10,215
1998	28,170	12,491
1999	28,117	—
2000	29,299	—
2001	29,402	—

Source: USDA FS annual report.

Table 44-10. Other forest-related direct employment

1.	Staffing in support of timber production for Indian lands	827
2.	Natural resource professionals working in Indian forestry	45
3.	Permanent employees in USDI Bureau of Land Management, March 2002	9,455
4.	Permanent employees in USDI National Park Service, March 2002	16,241
5.	Forestry related research employees in U.S. colleges and universities (full-time equivalents)	1,361
6.	Forestry related research employees in USDA Forest Service (full-time equivalents)	701
7.	Forestry related research employees in forest industry (full-time equivalents)	124
8.	Fire fighting and support jobs, nationwide during fire season, recent	12,000 to 15,000 for a typical year

Sources: (1) and (2), IFMAT 1993, pp. V-27–28; (3) and (4), US OPM 2003; (5) to (7), NRC 2002, p. 56; (8) Interagency Fire Center 2002.

Table 44-11. Full- and part-time employees for open land- and forest-based recreation and tourism by region, 1999

Region	Employment
North	376,401
South	360,432
Rocky Mountains	224,073
Pacific Coast	102,482
Interregional trade	28,188
Total	1,091,576

Sources: Minnesota Implan Group, Inc. 1997, using 1999 data; Congressional Research Service 1999; USDA NRCS 1997; USDA Forest Service 2002.

Table 44–12. Direct employment and indirect employment from indirect and induced effects of four forest-based sectors, 1999, using IMPLAN

Industry	Jobs per million dollars industry output				Industry output (million $)	Number of jobs[a]			
	Direct effect	Indirect effect	Induced effect	Total effect		Direct effect	Indirect effect	Induced effect	Total
Wood products	7.7	9.0	8.9	25.6	122,715	941,302	1,106,253	1,089,924	3,137,471
Wood furniture	8.2	8.3	9.2	25.8	70,963	584,973	588,602	655,881	1,829,448
Pulp and paper	4.0	7.8	8.2	20.1	167,293	669,733	1,310,387	1,375,560	3,355,671
All wood products	6.1	8.3	8.6	23.1	360,971	2,196,008	3,005,238	3,121,361	8,322,607
Recreation/tourism	16.1	5.8	8.1	30.3	67,726	1,091,576	389,568	549,569	2,030,713

[a] Number of jobs includes full-time, part-time, and self-employed jobs; number of direct jobs may differ from those in Table 44-1.
Sources: Minnesota Implan Group, Inc. 1997, using 1999 data; Congressional Research Service 1999; USDA NRCS 1997; USDA Forest Service 2002.